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Anand Prahlad

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PERKINS COIE LLP

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EXAMINER

GOLDEN, JAMES R

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/681,386	<b>Applicant(s)</b> PRAHLAD ET AL.	
	<b>Examiner</b> James Golden	<b>Art Unit</b> 2187	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.  
 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-17 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

The instant application 10/681386 has a total of 17 claims pending. There are 6 independent claims and 11 dependent claims.

### ***Drawings***

1. The corrections to the drawings received in the amendment dated 04/28/2006 are accepted by the examiner, and the objections are withdrawn.

### ***Specification***

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The title "Snapshot Storage and Management System with Indexing and User Interface" is suggested.

3. The corrections to the specification received in the amendment dated 04/28/2006 are accepted by the examiner, and the objections are withdrawn.

### ***Claim Objections***

4. The corrections to claim 8 received in the amendment dated 04/28/2006 is accepted by the examiner, and the objection is withdrawn.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-4, 7-8, 10 and 14-17** are rejected under 35 U.S.C. 102(e) as being anticipated by Welsh et al. (US 2004/0117572).

7. **With respect to claim 1** Welsh et al. disclose a method of managing stored data in a storage management system,

- the storage management system (Fig. 2) including
  - a storage manager (220 of Fig. 2) [0052, lines 2-5] [0053, lines 10-end],
  - a media agent (212 of Fig. 2) [0053, lines 1-2] connected to the storage manager (connection between 212 and 220 of Fig. 2), and
  - a primary volume (242 of Fig. 2) [0052, lines 4-end] connected to the media agent (indirect connection from 242 through 220 to 212),
- the method comprising [0055-0077]:
  - in accordance with a first criteria specified in a policy [0078, where the criterion specified in the policy is whether a snapshot command has been

received], taking a snapshot of the primary volume (at times 5-10 of Fig. 3) [0062, lines 3-6, where "Volume Granules" denote primary volume storage (see 0059) and "Cache Granules" denote snapshot storage (see 0060).

When a request to write data F into data block 3 of the Volume Granules is received at time 7, it is to replace data C. Data C is copied from block 3 of Volume granules into data block 3 of the Cache Granules as a snapshot at time 8, and data F is written into Volume Granules at time 9. The first snapshot is taken from times 5-10.];

- o indexing the snapshot by associating respective information with the snapshot (Fig. 34) [0133];
- o copying the indexed snapshot to a secondary volume (244 of Fig. 2) [0052, lines 4-end, where 244 is described as a cache that holds "snapshot caches," so the cache 244 acts as a secondary volume] [0062, lines 3-6; see above explanation of how data C is copied into data block 3 of the Cache Granules from data block 3 of the Volume Granules], and
- o repeating the taking, indexing, and copying steps for a plurality of snapshots (at times 5, 11 and 18 of Fig. 3) [0057, lines 12-end] [0062, lines 7-17], in accordance with at least a second criteria specified in the policy [0063, lines 10-14, where the second criterion is whether the first snapshot has finished].

8. **With respect to claim 2**, Welsh et al. disclose the method as recited in claim 1 (see above paragraph 7), further comprising displaying the snapshots to the user (Fig. 19) [0126].

9. **With respect to claim 3**, Welsh et al. disclose the method as recited in claim 2 (see above paragraph 8), wherein the displaying further includes displaying at least one of *a respective date of creation of each snapshot*, a respective persistence of each snapshot, and *a respective location of each snapshot* (Figs. 19, 21 and 38) [0126] [0150]

10. **With respect to claim 4**, Welsh et al. disclose the method as recited in claim 2 (see above paragraph 8), wherein the displaying includes displaying the snapshots to the user in a hierarchical format (Figs. 19 and 40-42) [0150].

11. **With respect to claim 7**, Welsh et al. disclose the method as recited in claim 4 (see above paragraph 10), further comprising: enabling the user to select a least one of the snapshots for restoration; and restoring the at least one snapshot selected by the user (Fig. 24) [0127].

12. **With respect to claim 8**, Welsh et al. disclose the method as recited in claim 2 (see above paragraph 8), further comprising enabling the user to delete a selected one of the snapshots (Fig. 22) [0126].

13. **With respect to claim 10**, Welsh et al. disclose a computer-executable code for managing stored data in a storage management system,

- the storage management system (Fig. 2) including
  - a storage manager (220 of Fig. 2) [0052, lines 2-5] [0053, lines 10-end],

- a media agent (212 of Fig. 2) [0053, lines 1-2] connected to the storage manager (connection between 212 and 220 of Fig. 2), and
- a primary volume (242 of Fig. 2) [0052, lines 4-end] connected to the media agent (indirect connection from 242 through 220 to 212),
- the code enabling the steps of [0055-0077]:
  - in accordance with a criteria specified in a policy [0078, where the criterion specified in the policy is whether a snapshot command has been received], taking a snapshot of the primary volume (at times 5-10 of Fig. 3) [0062, lines 3-6, where "Volume Granules" denote primary volume storage (see 0059) and "Cache Granules" denote snapshot storage (see 0060).  
When a request to write data F into data block 3 of the Volume Granules is received at time 7, it is to replace data C. Data C is copied from block 3 of Volume granules into data block 3 of the Cache Granules as a snapshot at time 8, and data F is written into Volume Granules at time 9. The first snapshot is taken from times 5-10.]
  - indexing the snapshot by associating respective information with the snapshot (Fig. 34) [0133];
  - copying the indexed snapshot to a secondary volume (244 of Fig. 2) [0052, lines 4-end, where 244 is described as a cache that holds "snapshot caches," so the cache 244 acts as a secondary volume] [0062, lines 3-6; see above explanation of how data C is copied into data block 3 of the Cache Granules from data block 3 of the Volume Granules], and

- repeating the taking, indexing, and copying steps for a plurality of snapshots (at times 5, 11 and 18 of Fig. 3) [0057, lines 12-end] [0062, lines 7-17], in accordance with at least a second criteria specified in the policy [0063, lines 10-14, where the second criterion is whether the first snapshot has finished].

14. **With respect to claim 14**, Welsh et al. disclose a method for periodically copying changing data on a primary volume, the method comprising:

- in accordance with a criteria specified in a policy [0078, where the criterion specified in the policy is whether a snapshot command has been received], capturing a first snapshot of data in a primary volume, the first snapshot being a block level copy of the data in the primary volume (970 of Fig. 9) [0009 describes how “the snapshot may be implemented... at the storage system block level”] [0106, lines 8-11];
- storing the first snapshot (970 of Fig. 9) [0106, lines 7-10];
- in accordance with at least a second criteria specified in the policy, monitoring for a change in any one of the blocks stored in the first snapshot (1110 of Fig. 11) [0114, lines 1-2, where the criterion specified in the policy is waiting for the system request];
- storing a copy of a particular block when the monitoring determines that there was a change in the particular block from the first snapshot (1125 of Fig. 11) [0115, lines 4-end].



15. **With respect to claim 15**, Welsh et al. disclose the method as recited in claim 14 (see above paragraph 14), further comprising: producing a copy of the primary volume using the first snapshot and any copies of blocks that changed after the first snapshot, after at least one block has changed since the first snapshot [0148, lines 1-7; during restoration of the system to a previous state, snapshot data from the snapshot cache is copied into its old locations in the primary volume].

16. **With respect to claim 16**, Welsh et al. disclose a copy of a primary volume produced by the steps of:

- in accordance with a first criteria specified in a policy [0078, where the criterion specified in the policy is whether a snapshot command has been received], capturing a first snapshot of data in a primary volume, the first snapshot being a block level copy of the data in the primary volume (970 of Fig. 9) [0009 describes how “the snapshot may be implemented... at the storage system block level”] [0106, lines 8-11];
- storing the first snapshot (970 of Fig. 9) [0106, lines 7-10];
- in accordance with at least a second criteria specified in the policy, monitoring for a change in any one of the blocks stored in the first snapshot (1110 of Fig. 11) [0114, line 1-2, where the criterion specified in the policy is waiting for the system request];
- storing a copy of a particular block when the monitoring determines that there was a change in the particular block from the first snapshot (1125 of Fig. 11) [0115, lines 4-end];

- and producing a copy of the primary volume using the first snapshot and any copies of blocks that changed after the first snapshot, after at least one block has changed since the first snapshot [0148, lines 1-7; during restoration of the system to a previous state, snapshot data from the snapshot cache is copied into its old locations in the primary volume].

17. **With respect to claim 17**, Welsh et al. disclose a method of managing stored data in a storage management system, the method comprising taking a snapshot of the primary volume;

- the storage management system (Fig. 2) including
  - a storage manager (220 of Fig. 2) [0052, lines 2-5] [0053, lines 10-end],
  - a media agent (212 of Fig. 2) [0053, lines 1-2] connected to the storage manager (connection between 212 and 220 of Fig. 2), and
  - a primary volume (242 of Fig. 2) [0052, lines 4-end] connected to the media agent (indirect connection from 242 through 220 to 212),
- the method comprising [0055-0077]:
  - in accordance with a criteria specified in a policy [0078, where the criterion specified in the policy is whether a snapshot command has been received], taking a snapshot of the primary volume (at times 5-10 of Fig. 3) [0062, lines 3-6, where "Volume Granules" denote primary volume storage (see 0059) and "Cache Granules" denote snapshot storage (see 0060).  
When a request to write data F into data block 3 of the Volume Granules is received at time 7, it is to replace data C. Data C is copied from block 3

of Volume granules into data block 3 of the Cache Granules as a snapshot at time 8, and data F is written into Volume Granules at time 9. The first snapshot is taken from times 5-10.]

- identifying characteristics associated with the snapshot (Fig. 19) [0133];  
and
- storing the characteristics in an index (Fig. 34) [0133];

18. **Claims 1-4, 7-8, 10 and 17** are rejected under 35 U.S.C. 102(b) as being anticipated by Dunphy et al. (US 5,638,509).

19. **With respect to claim 1**, Dunphy et al. disclose a method of managing stored data in a storage management system,

- the storage management system (Fig. 1) including
  - a storage manager (16 of Fig. 1; column 6, lines 41-46),
  - a media agent (11 of Fig. 1; column 1, lines 38-56) connected to the storage manager (11 connected to 16 indirectly through 14 of Fig. 1), and
  - a primary volume (9 of Fig. 1; column 1, lines 36-38) connected to the media agent (9 connected to 11 indirectly through 19 of Fig. 1),
- the method comprising:
  - in accordance with a first criteria specified in a policy (column 2, lines 1-4, where the first criteria specified in a policy is whether a period of time has passed), taking a snapshot of the primary volume (column 2, lines 9-11);

- indexing the snapshot by associating respective information with the snapshot (column 1, lines 61-65; column 2, lines 9-11; column 4, lines 25-39);
- copying the indexed snapshot to a secondary volume (column 2, lines 9-11), and
- repeating the taking, indexing, and copying steps for a plurality of snapshots (column 2, lines 15-25), in accordance with at least a second criteria specified in the policy (column 2, lines 20-25, where the second criteria specified in the policy is whether another period of time has passed).

20. **With respect to claim 2**, Dunphy et al. disclose the method as recited in claim 1 (see above paragraph 19), further comprising displaying the snapshots to the user (Fig. 4; column 8, lines 34-61).

21. **With respect to claim 3**, Dunphy et al. disclose the method as recited in claim 2 (see above paragraph 20), wherein the displaying further includes displaying at least one of a *respective date of creation of each snapshot*, a *respective persistence of each snapshot*, and a *respective location of each snapshot* (Fig. 4; column 4, lines 32-36).

22. **With respect to claim 4**, Dunphy et al. disclose the method as recited in claim 2 (see above paragraph 20) wherein the displaying includes displaying the snapshots to the user in a hierarchical format (column 8, lines 39-61).

23. **With respect to claim 7**, Dunphy et al. disclose the method as recited in claim 4 (see above paragraph 22), further comprising: enabling the user to select a least one of

the snapshots for restoration; and restoring the at least one snapshot selected by the user (44 of Fig. 4; 52 of Fig. 5; column 8, lines 62-64).

24. **With respect to claim 8**, Dunphy et al. disclose the method as recited in claim 2 (see above paragraph 20), further comprising enabling the user delete a selected one of the snapshots (43 of Fig. 4; column 8, lines 52-61).

25. **With respect to claim 10**, Dunphy et al. disclose a computer-executable code for managing stored data in a storage management system,

- the storage management system (Fig. 1) including
  - a storage manager (16 of Fig. 1; column 6, lines 41-46),
  - a media agent (11 of Fig. 1; column 1, lines 38-56) connected to the storage manager (11 connected to 16 indirectly through 14 of Fig. 1), and
  - a primary volume (9 of Fig. 1; column 1, lines 36-38) connected to the media agent (9 connected to 11 indirectly through 19 of Fig. 1),
- the code enabling the steps of:
  - in accordance with a first criteria specified in a policy (column 2, lines 1-4, where the first criteria specified in a policy is whether a certain period of time has passed), taking a snapshot of the primary volume (column 2, lines 9-11);
  - indexing the snapshot by associating respective information with the snapshot (column 1, lines 61-65; column 2, lines 9-11; column 4, lines 25-39);

- copying the indexed snapshot to a secondary volume (column 2, lines 9-11), and repeating the taking, indexing, and copying steps for a plurality of snapshots (column 2, lines 15-25), in accordance with at least a second criteria specified in the policy (column 2, lines 20-25, where the second criteria specified in the policy is whether another period of time has passed).

26. **With respect to claim 17**, Dunphy et al. disclose a method of managing stored data in a storage management system, the method comprising taking a snapshot of the primary volume;

- the storage management system (Fig. 1) including
  - a storage manager (16 of Fig. 1; column 6, lines 41-46),
  - a media agent (11 of Fig. 1; column 1, lines 38-56) connected to the storage manager (11 connected to 16 indirectly through 14 of Fig. 1), and
  - a primary volume (9 of Fig. 1; column 1, lines 36-38) connected to the media agent (9 connected to 11 indirectly through 19 of Fig. 1),
- the method comprising:
  - in accordance with a first criteria specified in a policy (column 2, lines 1-4, where the first criteria specified in a policy is whether a certain period of time has passed), taking a snapshot of the primary volume (column 2, lines 9-11);

- o identifying characteristics associated with the snapshot and storing the characteristics in an index (column 1, lines 61-65; column 2, lines 9-11; column 4, lines 25-39).

***Claim Rejections - 35 USC § 103***

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. **Claims 5-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Welsh et al. (US 2004/0117572), as applied to claims 1-4, 7-8, 10 and 14-17 above (see paragraphs 6-17), in view of De Meno et al. (US 6,721,767).

29. **With respect to claim 5**, Welsh et al. disclose the method as recited in claim 1 (see above paragraph 7). Welsh et al. do not disclose expressly the limitation further comprising associating each respective snapshot with a corresponding application.

However, De Meno et al. disclose the limitation further comprising associating each respective snapshot with a corresponding application (column 1, lines 53-57).

Welsh et al. and De Meno et al. are analogous art because they are from the same field of endeavor, namely incremental data backup.

At the time of invention it would have been obvious to a person of ordinary skill in the art to apply the application-specific snapshot method of De Meno et al. to the snapshot backup system of Welsh et al. The motivation for doing so would have been

to provide "access to a specific version of the application specific data when requested by a user such that the application specific data from a user selected date is accessible" (column 1, lines 64-67).

Therefore, it would have been obvious to combine De Meno et al. with Welsh et al. for the benefit of a snapshot storage system that can take snapshots of specific application data to obtain the invention as specified in claim 5.

30. **With respect to claim 6**, Welsh et al. in view of De Meno et al. disclose the method as recited in claim 5 (see above paragraph 29). Welsh et al. do not disclose expressly the limitation further comprising displaying to a user a respective one of the snapshots in a screen corresponding to the respective application.

However, De Meno et al. disclose the limitation further displaying to a user a respective one of the snapshots in a screen corresponding to the respective application (Fig. 4).

Welsh et al. and De Meno et al. are analogous art because they are from the same field of endeavor, namely incremental data backup.

At the time of invention it would have been obvious to a person of ordinary skill in the art to combine the snapshots of data in a particular application and their display screen of De Meno et al. with the snapshot storage mechanism of Welsh et al. The motivation for doing so would have been to "call the method by which a trigger variable/expression and associated execution snapshots could be presented to the user and a corresponding process execution state can be restored" [0042].



Therefore, it would have been obvious to combine De Meno et al. with Welsh et al. for the benefit of a user interface that displays the snapshots of data for a particular application to obtain the invention as specified in claim 6.

31. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Welsh et al. (US 2004/0117572), as applied to claims 1-4, 7-8, 10 and 14-17 above (see paragraphs 6-17), in view of Midgely et al. (US 5,604,862).

32. **With respect to claim 9**, Welsh et al. disclose the method as recited in claim 1 (see above paragraph 7). Welsh et al. do not expressly disclose the limitation further comprising deleting a snapshot after a defined period of time.

However, Midgely et al. disclose the limitation further comprising deleting a snapshot after a defined period of time (column 7, lines 11-17).

Welsh et al. and Midgely et al. are analogous art because they are both from the same field of endeavor, namely snapshot data storage.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the periodic deletion of snapshots of Midgely et al. with the snapshot storage system of Welsh et al. The motivation for doing so would have been to clear space on the disk cache for new snapshots when the cache is nearly full (column 7, lines 14-15).

Therefore, it would have been obvious to combine Midgely et al. with Welsh et al. for the benefit of a snapshot storage system that automatically deletes older snapshots when the snapshot memory is nearly full.

33. **Claims 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (US 6,021,475) in view of Welsh et al. (US 2004/0117572).

34. **With respect to claim 11**, Nguyen et al. disclose a method for replacing data in a primary volume stored at a first device ('72'x, column 7, lines 43-45) associated with a first logical unit number with data in a recovery volume ('63'x, column 7, lines 41-43) stored at a second device associated with a second logical unit number, the method comprising:

- updating a memory (DEF\_DEV\_ADDR, column 7, line 37) to indicate that the primary volume is no longer associated with the first logical unit number (column 7, lines 43-48; column 8, lines 15-33);
- updating the memory to indicate that the recovery volume is no longer associated with the second logical unit number (column 7, lines 43-45; column 8, lines 15-33);
- and updating the memory to indicate that the recovery volume is associated with the first logical unit number (column 7, lines 43-45; column 8, lines 15-33).

Nguyen et al. do not disclose expressly the limitation wherein the recovery volume includes a plurality of snapshots of the primary volume.

However, Welsh et al. disclose the limitation wherein the recovery volume includes a plurality of snapshots of the primary volume (column 2, lines 9-15).

Nguyen et al. and Welsh et al. are analogous art because they are from the same field of endeavor, namely data storage and recovery.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the drive address swap system of Nguyen with the snapshot storage system of Welsh et al. The motivation for doing so would have been "to enable the system to later locate and retrieve a single lost data file or to recreate the state of a selected data file or the computer system at a selected point in time" (column 2, lines 11-15)

Therefore, it would have been obvious to combine Welsh et al. with Nguyen et al. for the benefit of a drive address swap system that uses the snapshot storage to obtain the invention as specified in claim 11.

35. **With respect to claim 12**, Nguyen et al. in view of Welsh et al. disclose the method as recited in claim 11 (see above paragraph 34). Nguyen et al. disclose the further limitation wherein metadata associated with primary volume is maintained in association with the first logical unit number (column 8, lines 15-33).

36. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (US 6,021,475) in view of Welsh et al. (US 2004/0117572) as applied to claims 11 and 12 above (see paragraphs 33-35), and further in view of LeCrone et al. (US 6,631,477).

37. **With respect to claim 13**, Nguyen et al. in view of Welsh et al. disclose the method as recited in claim 11 (see above paragraph 34). Nguyen et al. in view of Welsh et al. do not disclose expressly the limitation where input and output to both the recovery and primary volumes is suspended during the updating steps.

However, LeCrone et al. disclose the limitation where input and output to both the recovery and primary volumes is suspended during the updating steps (column 9, lines 62-66).

Nguyen et al., Welsh et al. and LeCrone et al. are analogous art because they are from the same field of endeavor, namely data storage and recovery.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to suspend input and output to and from the primary and recovery volumes of the snapshot data storage system. The motivation for doing so would have been because the volumes could not service the requests when their logical addresses were being changed.

Therefore, it would have been obvious to combine LeCrone et al. with Nguyen et al. and Welsh et al. for the benefit of a suspension of data input and output during the time when the logical addresses are swapped to obtain the invention as specified in claim 13.

38. **Claims 5-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunphy et al. (US 5,638,509), as applied to claims 1-4, 7-8, 10 and 17 above (see paragraphs 18-26), in view of De Meno et al. (US 6,721,767).

39. **With respect to claim 5**, Dunphy et al. disclose the method as recited in claim 1 (see above paragraph 19). Dunphy et al. do not disclose expressly the limitation further comprising associating each respective snapshot with a corresponding application.

However, De Meno et al. disclose the limitation further comprising associating each respective snapshot with a corresponding application (column 1, lines 53-57).

Dunphy et al. and De Meno et al. are analogous art because they are from the same field of endeavor, namely incremental data backup.

At the time of invention it would have been obvious to a person of ordinary skill in the art to apply the application-specific snapshot method of De Meno et al. to the snapshot backup system of Dunphy et al. The motivation for doing so would have been to provide "access to a specific version of the application specific data when requested by a user such that the application specific data from a user selected date is accessible" (column 1, lines 64-67).

Therefore, it would have been obvious to combine De Meno et al. with Dunphy et al. for the benefit of a snapshot storage system that can take snapshots of specific application data to obtain the invention as specified in claim 5.

40. **With respect to claim 6**, Dunphy et al. in view of De Meno et al. disclose the method as recited in claim 5 (see above paragraph 39). Dunphy et al. do not disclose expressly the limitation further comprising displaying to a user a respective one of the snapshots in a screen corresponding to the respective application.

However, De Meno et al. disclose the limitation further displaying to a user a respective one of the snapshots in a screen corresponding to the respective application (Fig. 4).

Dunphy et al. and De Meno et al. are analogous art because they are from the same field of endeavor, namely incremental data backup.

At the time of invention it would have been obvious to a person of ordinary skill in the art to combine the snapshots of data in a particular application and their display

screen of De Meno et al. with the snapshot storage mechanism of Dunphy et al. The motivation for doing so would have been to “call the method by which a trigger variable/expression and associated execution snapshots could be presented to the user and a corresponding process execution state can be restored” [0042].

Therefore, it would have been obvious to combine De Meno et al. with Dunphy et al. for the benefit of a user interface that displays the snapshots of data for a particular application to obtain the invention as specified in claim 6.

41. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunphy et al. (US 5,638,509), as applied to claims 1-4, 7-8, 10 and 17 above (see paragraphs 18-26), in view of Midgely et al. (US 5,604,862).

42. **With respect to claim 9**, Dunphy et al. both disclose the method as recited in claim 1 (see above paragraph 19). Dunphy et al. do not expressly disclose the limitation further comprising deleting a snapshot after a defined period of time.

However, Midgely et al. disclose the limitation further comprising deleting a snapshot after a defined period of time (column 7, lines 11-17).

Dunphy et al. and Midgely et al. are analogous art because they are both from the same field of endeavor, namely snapshot data storage.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the periodic deletion of snapshots of Midgely et al. with the snapshot storage system of Welsh et al. or Dunphy et al. The motivation for doing so would have been to clear space on the disk cache for new snapshots when the cache is nearly full (column 7, lines 14-15).

Therefore, it would have been obvious to combine Midgely et al. with Dunphy et al. for the benefit of a snapshot storage system that automatically deletes older snapshots when the snapshot memory is nearly full.

43. **Claims 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (US 6,021,475) in view of Dunphy et al. (US 5,638,509).

44. **With respect to claim 11**, Nguyen et al. disclose a method for replacing data in a primary volume stored at a first device ('72'x, column 7, lines 41-43) associated with a first logical unit number with data in a recovery volume ('63'x, column 7, lines 41-43) stored at a second device associated with a second logical unit number, the method comprising:

- updating a memory (DEF\_DEV\_ADDR, column 7, line 37) to indicate that the primary volume is no longer associated with the first logical unit number (column 7, lines 43-48; column 8, lines 15-33);
- updating the memory to indicate that the recovery volume is no longer associated with the second logical unit number (column 7, lines 43-45; column 8, lines 15-33);
- and updating the memory to indicate that the recovery volume is associated with the first logical unit number (column 7, lines 43-45; column 8, lines 15-33).

Nguyen et al. do not disclose expressly the limitation wherein the recovery volume includes a plurality of snapshots of the primary volume.

However, Dunphy et al. disclose the limitation wherein the recovery volume includes a plurality of snapshots of the primary volume (column 2, lines 9-15).

Nguyen et al. and Dunphy et al. are analogous art because they are from the same field of endeavor, namely data storage and recovery.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the drive address swap system of Nguyen with the snapshot storage system of Dunphy et al. The motivation for doing so would have been "to enable the system to later locate and retrieve a single lost data file or to recreate the state of a selected data file or the computer system at a selected point in time" (column 2, lines 11-15)

Therefore, it would have been obvious to combine Dunphy et al. with Nguyen et al. for the benefit of a drive address swap system that uses the snapshot storage to obtain the invention as specified in claim 11.

45. **With respect to claim 12**, Nguyen et al. in view of Dunphy et al. disclose the method as recited in claim 11 (see above paragraph 44). Nguyen et al. disclose the further limitation wherein metadata associated with primary volume is maintained in association with the first logical unit number (column 8, lines 15-33).

46. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (US 6,021,475) in view of Dunphy et al. (US 5,638,509) as applied to claims 11 and 12 above (see paragraphs 43-45), and further in view of LeCrone et al. (US 6,631,477).

47. **With respect to claim 13**, Nguyen et al. in view of Dunphy et al. (US 5,638,509) disclose the method as recited in claim 11 (see above paragraph 44). Nguyen et al. in



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view of Welsh et al. do not disclose expressly the limitation where input and output to both the recovery and primary volumes is suspended during the updating steps.

However, LeCrone et al. disclose the limitation where input and output to both the recovery and primary volumes is suspended during the updating steps (column 9, lines 62-66).

Nguyen et al., Dunphy et al. and LeCrone et al. are analogous art because they are from the same field of endeavor, namely data storage and recovery.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to suspend input and output to and from the primary and recovery volumes of the snapshot data storage system. The motivation for doing so would have been because the volumes could not service the requests when their logical addresses were being changed.

Therefore, it would have been obvious to combine LeCrone et al. with Nguyen et al. and Dunphy et al. for the benefit of a suspension of data input and output during the time when the logical addresses are swapped to obtain the invention as specified in claim 13.

### ***Response to Arguments***

48. Applicant's arguments filed 04/28/2006 have been fully considered but they are not persuasive.

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49. **With respect to the applicant's argument regarding the rejection of claims 1-4, 7-8, 10 and 14-17 as anticipated by Welsh**, the specifics of the policy are not claimed subject matter. See the new grounds of rejection found in Welsh as above.

50. **With respect to the applicant's argument regarding the rejection of claims 1-4, 7-8, 10 and 17 as anticipated by Dunphy et al.**, the details that characterize a snapshot are not claimed. The system of Dunphy et al. "stores copies of data files in a manner that enables a user to recreate the state of the computer system at any selected point in time" (abstract), and this matches the definition of a snapshot, which is well known in the art as being "a copy of all or portions of the data contained in storage or in a database at a particular point in time" (IEEE Dictionary of Standards Terms, page 1066, column 1, entry 13).

Additionally, the specifics of the policy are not claimed subject matter. See the new grounds of rejection found in Dunphy et al. as above.

51. **With respect to the applicant's argument regarding the rejection of claims 11-13 as anticipated by Nguyen et al.**, Nguyen et al. describe mapping devices in the same manner as the claims. Claim 11 states that "the recovery volume is associated with the first logical number", and Nguyen teaches this in column 7, lines 45-48: "any operation that otherwise would be directed to the device having an HDA of `63`x will, by the DEF\_DEV\_ADDR register mapping, instead be directed to the device having an HDA of `72`x." The recovery volume is associated with the first logical unit number in that an operation directed to the first logical unit number is forwarded to the recovery volume, and this association is reflected by updating the DEF\_DEV\_ADDR register

mapping with the second logical unit number when the primary volume fails. In the claim, "associated with" is not interpreted by the examiner to necessarily mean updating a memory location with the first logical unit number, but, more broadly, that the unit number is associated with the recovery volume.

### ***Conclusion***

52. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

53. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Golden whose telephone number is 571-272-5628. The examiner can normally be reached on Monday-Friday, 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


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James R. Golden  
Patent Examiner  
Art Unit 2187



July 22, 2006



Brian R. Paugh  
Primary Examiner